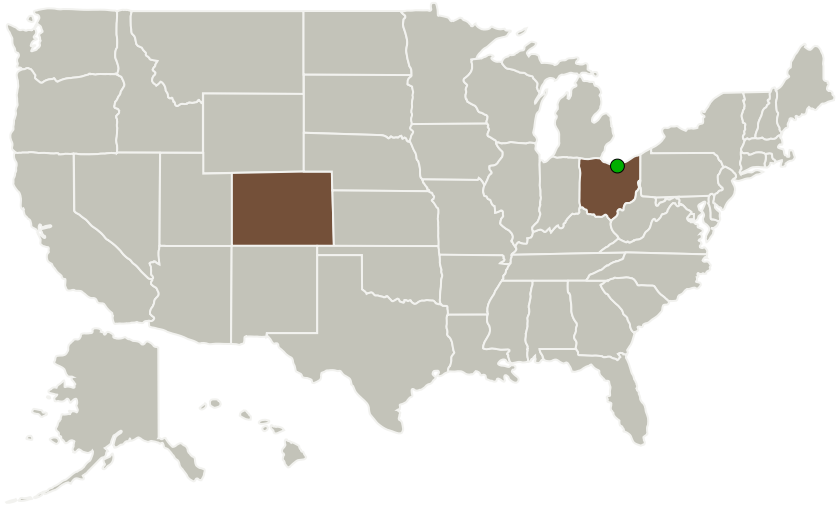
ISRU CO2 Recovery, Phase I

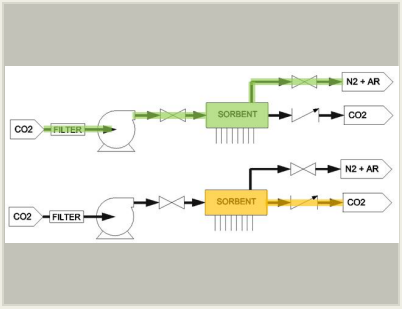
Completed Technology Project (2017 - 2017)

Project Introduction

Human exploration of Mars and unmanned sample return missions can benefit greatly from the resources available on Mars. The first major step of any Mars in-situ propellant production system is the acquisition of carbon dioxide and its compression for further processing. TDA Research Inc. proposes to develop a compact, lightweight, advanced sorbent-based compressor to recover high-pressure, high purity CO2 from the Martian atmosphere. The system eliminates the need for a mechanical pump, increasing the reliability with relatively low power consumption. TDA?s system uses a new, high capacity sorbent that selectively adsorbs CO2 at 0.1 psia and regenerates by temperature swing, producing a continuous, high purity CO2 flow at pressure (> 15 psia). In the Phase I work, we successfully completed bench-scale proof-of-concept demonstrations, elevating the TRL to 3. In Phase II, we will further optimize the sorbent and scale-up its production using advanced manufacturing techniques such as continuous microwave synthesis. We will carry out multiple adsorption/desorption cycles to demonstrate the sorbent's cycle life. Finally, we will design and fabricate a sub-scale prototype to fully demonstrate the technology under simulated Martian atmospheres (TRL-5); this unit will be sent to NASA for further testing and evaluation.

Primary U.S. Work Locations and Key Partners





ISRU CO2 Recovery, Phase I Briefing Chart Image

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TDA Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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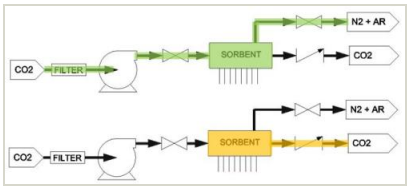
Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Images



Briefing Chart Image
ISRU CO2 Recovery, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/136945)

Project Management

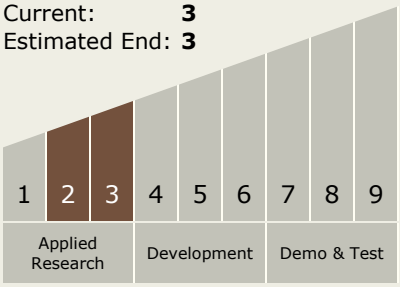
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Gokhan Alptekin

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.2 Resource Acquisition, Isolation, and Preparation